

Kindly add the following new Claim 38:

38. (New) A plasma processing apparatus according to Claim 33, wherein the compensating means inhibits a variation of the pressure in the chamber between the first and second steps.

REMARKS

Summary

By this Amendment, Claims 1, 4, 5, 19, 33, 34 and 35 have been revised, and new Claim 38 is presented for the Examiner's consideration.

Accordingly, Claims 1-35 and 38 are now pending in the application.

Allowable Claims

Applicants acknowledge with thanks that Claims 31 and 32 are allowed.

35 U.S.C. ¶102 and ¶103

Claims 1-12, 13-18, 26-28 and 33-35 were rejected under 35 U.S.C. ¶102 or ¶103 as being unpatentable over Kawasaki et al., taken alone or in combination with Sandinsky or Leiphart, for the reasons stated at pages 2-5 of the Office Action. Applicants respectfully traverse this rejection with respect to the now-pending claims.

In the Office Action, the Examiner states:

“Kawasaki et al. further disclose that the plasma generation for the two steps are stabilized by a matching box, that consists of capacitor (col. 3, lines 53-65 and col. 16, lines 19-21.)”

In response, the Examiner’s attention is initially directed to independent Claims 1 and 33. According to the presently claimed invention, the plasma is stabilized during the transition between the first and second steps by compensating for an impedance mismatch between an impedance of the power supply used to form the plasma and an impedance of the plasma.

The RF power source 13 and capacitor 12 of Kawasaki et al. (referred to by the Examiner) are not used to form the plasma, but instead are used to D.C. bias the sample table 5a so as to accelerate already formed ions in the plasma towards the sample table 5a. Col. 4, lines 11-31. The plasma itself is formed by the magnetron 8 and the electromagnetic coil 10. Col. 4, lines 4-10. Nowhere does Kawasaki et al. describe compensating for an impedance mismatch between the plasma and the power supply used to form the plasma.

Specifically, Kawasaki et al. does not teach or suggest stabilization of plasma during a transition between the first and second steps by compensating for an impedance mismatch between an impedance of the power supply used to form

the plasma and an impedance of the plasma. Sadinsky and Leiphart also clearly fail to teach or suggest at least this aspect of the invention.

For at least the reasons stated above, Applicants respectfully contend that all of the now-pending claims define over the teachings of Kawasaki et al., taken individually or in combination with Sadinsky and/or Leiphart.

35 U.S.C. ¶102

Claims 1-5, 19-25, 29-30 and 33-35 were rejected under 35 U.S.C. ¶102 as being unpatentable over Okudaira et al. for the reasons stated at pages 3-4 of the Office Action. Applicants respectfully traverse this rejection with respect to the now-pending claims.

In the Office Action, the Examiner states:

“Okudaira et al. further disclose that the intensity of the power is controlled by an impedance matching circuit for compensating the high frequency power supply (col. 5, lines 15-17)”

As with Kawasaki et al. discussed above, the power supply of Okudaira referred to by the Examiner is not for forming the plasma in the chamber. Rather, the power supply 9 of Okudaira is coupled to the stand 6 via an impedance matching circuit. Col. 5, lines 15-18. Note that it is the microwave generating

power supply 10 that generates the plasma. Col. 5, lines 4-5. Nowhere does Okudaira et al. describe compensating for an impedance mismatch between the microwave generating power supply 10 and the plasma.

Specifically, Okudaira et al. does not teach or suggest stabilization of plasma during a transition between the first and second steps by compensating for an impedance mismatch between an impedance of the power supply used to form the plasma and an impedance of the plasma.

For at least the reasons stated above, Applicants respectfully contend that all of the now-pending claims define over the teachings of Okudaira et al.


Conclusion

No other issues remaining, reconsideration and favorable action upon the Claims 1-35 and 38 now-pending in the application are requested.

Respectfully submitted,

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ATTACHMENT "A"

1. (Twice amended) A method of processing a workpiece in a chamber, the method comprising:

- (a) ~~[striking]~~ using a power supply to form a plasma in the chamber;
- (b) treating the workpiece by cyclically adjusting the processing parameters between at least a first step having a first set of processing parameters and a second step having a second set of process parameters; and
- (c) ~~[stabilizing]~~ compensating for an impedance mismatch between an impedance of the power supply and an impedance of the plasma to stabilize the plasma during the transition between the first and second steps.

4. (Twice amended) A method according to Claim 1, wherein the power supply supplies RF power that is inductively coupled to the plasma.

5. (Thrice amended) A method according to Claim 1, wherein the plasma is inductively formed by use of a coil which is driven by the power supply, and wherein ~~[the plasma is stabilized by matching]~~ the impedance of the plasma is matched with ~~[to]~~ the impedance of the power supply ~~[which provides energy to~~

~~the plasma by means of]~~ using a matching unit operatively connected between the power supply and the coil.

19. (Thrice amended) A method according to Claim 1, wherein said compensating for the impedance mismatch includes controlling the pressure in the chamber to inhibit ~~[stabilization of the]~~ variations in the impedance of the plasma ~~[is enhanced by substantially preventing or reducing variation of the pressure in the chamber]~~ between the first and second steps.

33. (Twice amended) A plasma processing apparatus comprising a chamber having a support for a workpiece, power supply means for ~~[striking]~~ forming a plasma in the chamber, means for cyclically adjusting processing parameters between a first and a second step, and means for compensating for a impedance mismatch between an impedance of the power supply means and an impedance of the plasma to stabilize ~~[stabilizing]~~ the plasma during the transition between the first and second steps.

34. (Amended) A plasma processing apparatus according to Claim 33, wherein the ~~[stabilizing]~~ compensating means comprising a matching unit for

matching the impedance of the plasma to the impedance of [a] the power supply
means [~~which supplies power to the plasma~~].

35. (Thrice amended) A plasma processing apparatus according to Claim
33, wherein power supply means comprises an RF power supply which generates
an RF power signal, and wherein the [~~stabilizing~~] compensating means comprises
means to vary a frequency of the RF power signal [~~supply frequency, or means for~~
~~reducing the variation of the pressure in the chamber between the first and second~~
~~steps~~].